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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/728,540	12/05/2003	Masato Higuchi	36856.1178	8279

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EXAMINER

MAYES, MELVIN C

ART UNIT PAPER NUMBER

1734

DATE MAILED: 10/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/728,540	<b>Applicant(s)</b> HIGUCHI ET AL.	
	<b>Examiner</b> Melvin Curtis Mayes	<b>Art Unit</b> 1734	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 August 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,2,5-25 and 39 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 8,20 and 39 is/are allowed.
- 6) ☒ Claim(s) 1,2,5-7,9-19 and 21-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

(1)

The indicated allowability of claims 4 and 5, now Claims 1 and 5, is withdrawn.

### *Claim Rejections - 35 USC § 112*

(2)

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

(3)

Claim 5 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 5 claims “the **step of hot-press bonding** is carried out by a mold-frame after **hot-press bonding step**” which is not clear because “hot -press bonding step” is mentioned twice. It is suggested that the claim be amended to make it clear pressing by a mold-frame is after hot-press bonding by the roller.

***Claim Rejections - 35 USC § 103***

(4)

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

(5)

Claims 1, 2, 5-7, 9-14, 18, 19, 21, 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Furukawa et al. 6,262,513 in view of JP 2002-217220, JP 7-176565 and JP 2003-283295.

Furukawa et al. disclose a method of producing an electronic component comprising: connecting a functional device such as a surface acoustic wave device having an electrode to a ceramic printed circuit board having wiring pattern through bumps disposed on the device by face-down bonding (flip chip bonding); disposing a preformed sheet of resin such as epoxy on the device; heating to melt the resin sheet to coat the device and connect to the printed circuit board; and hardening the resin. Furukawa et al. disclose that a plurality of surface acoustic wave devices can be assembled with an aggregate of printed circuit boards (substrate), a sheet of resin aligned to the aggregate and melted and hardened, then the aggregate of printed circuit boards is divided (dicing) with the resin sheet to obtain a plurality of individual surface acoustic wave apparatuses. Furukawa et al. disclose that the method can be used for functional devices such as surface acoustic wave devices and piezoelectric oscillators or resonators, disclose that a frame-shaped insulating wall or dam can be included to improve the sealing effect and prevent resin from spreading into the space between the device and printed circuit board, disclose that the space (gap) between the device and printed circuit board is in the range of 10-200  $\mu\text{m}$  and

Art Unit: 1734

disclose that the choice of dimension of the functional device can be suitably done depending on a volume of the device and a thickness of the resin sheet (col. 26, lines 42-47, col. 27, lines 10-15 and 60-63, col. 28, lines 35-37, col. 29, line 57 – col. 31, line 3, col. 121 and 128, Fig. 14).

Furukawa et al. do not disclose pressing the resin sheet by a roller during heating while the aggregate circuit board (substrate) is fixed to a flat-surface stage then pressing the resin sheet by a mold-frame.

JP 2002-217220 (JP '220) teaches that for bonding elements such as surface acoustic elements and a resin film on a mounting substrate such as of ceramic, the mounting substrate is placed on a heater 37 for heating the mounting substrate and resin film to raise the temperature of the resin film to soften and harden the film to fix the film to the substrate. As shown, the heater is a plate on which the substrate is placed (computer translation).

JP 7-176565 (JP '565) teaches that a protective film can be heat laminated to a wiring board substrate using a pair of rollers (computer translation [0023], Fig. 5g).

JP 2003-283295 (JP '295) teaches that to provide a surface acoustic wave device which has a resin sealed structure without voids in the side face of the device and improved closure dependability, the resin arranged on the surface acoustic wave elements is pressed against elements with a mold having heights formed corresponding to the clearance between elements so that the resin can fully enter the clearance between elements and the adhesion between the resin and base substrate is raised, before the resin and base substrate are cut to form individual devices (computer translation).

It would have been obvious to one of ordinary skill in the art to have modified the method of Furukawa et al. for producing an electronic component by heat connecting the resin

Art Unit: 1734

sheet to the aggregate of printed circuit boards (substrate) by placing the aggregate on a heater plate, as taught by JP '220, as used to heat a ceramic mounting substrate and resin film to raise the temperature of the resin film to soften and harden the film to fix the film to the substrate.

It would have been obvious to one of ordinary skill in the art to have further modified the method of Furukawa et al. by laminating the resin sheet to the circuit board aggregate using a pair of rollers, as taught by JP '565, as means used to laminate a film to a wiring board. The use of a pair of rollers for laminating the resin sheet to the devices on the circuit board aggregate while heating and softening the resin sheet using a heating plate on which the aggregate is placed would have been obvious to one of ordinary skill in the art to provide means to heat and soften the resin sheet while providing means to simultaneously press the resin sheet onto the substrate, as suggested by JP '220 and JP '565.

Further, after laminating the resin sheet by roller, pressing the resin sheet by a mold having heights formed corresponding clearance between the devices would have been obvious to one of ordinary skill in the art, as taught by JP '295, to provide a surface acoustic wave device which has a resin sealed structure without voids in the side face of the device and improved closure dependability by using the mold to press the resin so that the resin can fully enter the clearance between elements and the adhesion between the resin and base substrate is raised. Following the laminating of the resin sheet using rollers with pressing by a mold as taught by JP '295 would have been obvious to one of ordinary skill in the art for improved resin sealing of the devices to the circuit board. Performing further steps of laminating by roller and pressing by the mold, as claimed in Claim 7, would have been obvious to one of ordinary skill in the art to ensure laminating and sealing by the resin.

Art Unit: 1734

Disposing a resin-flowing out prevent frame on the end portion of the printed circuit board aggregate and sealing-assisting pieces in the form of a sheet of particular height and having openings on the printed circuit board aggregate, as claimed in Claims 9-14, would have been obvious to one of ordinary skill in the art, as Furukawa et al. disclose that a frame-shaped insulating wall or dam can be included to improve the sealing effect and prevent resin from spreading into the space between the device and printed circuit board.

The particular relationship of distance between devices and thickness of devices, as claimed in Claim 19 would have been obvious to one of ordinary skill in the art to allow space for insulating walls and the resin to connect to the circuit boards.

By the use of a resin sheet of epoxy, a resin film having a volume resistivity of up to about  $10^{10} \Omega\text{-m}$ , as claimed in Claim 21, is obviously provided.

(6)

Claims 15 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 1, and further in view of Uchikoba 2002/0044030.

Uchikoba teaches that in mounting surface acoustic wave (SAW) elements on a ceramic substrate, the ceramic substrate is subjected to a cleaning procedure such as plasma cleaning with argon plasma prior to mounting the SAW elements [0069],[0079].

JP 61-295025 Abstract teaches that in bonding a resin thin film to a substrate such as of ceramic, the resin film and substrate may be treated with corona or plasma.

It would have been obvious to one of ordinary skill in the art to have modified the method of the references as combined for mounting a SAW device on a ceramic substrate by

Art Unit: 1734

subjecting the aggregate of ceramic circuit boards to argon plasma (plasma irradiation) before mounting the SAW devices, as taught by Uchikoba, to clean the ceramic substrate.

(7)

Claims 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 1, and further in view of JP 61-295025 Abstract.

JP 61-295025 Abstract teaches that in bonding a resin thin film to a substrate such as of ceramic, the resin film and substrate may be treated with corona or plasma.

It would have been obvious to one of ordinary skill in the art to have modified the method of the references as combined for mounting a SAW device on a ceramic substrate by subjecting the aggregate of ceramic circuit boards to corona (corona-discharge) or plasma (plasma irradiation), as taught by JP '025 Abstract, as treatment performed of both a substrate such as ceramic and a resin film for bonding the film and substrate. The use of corona discharge or plasma (plasma irradiation) would have been obvious to one of ordinary skill in the art as treatment methods used to improve adhesion. Treating the ceramic board substrate with corona discharge or plasma either before or after mounting the SAW devices would have been obvious to one of ordinary skill in the art, as long as the substrate is treated before disposing the resin sheet to be bonded.



(8)

Claims 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 1, further in view of Bureau et al. 6,492,194.

Bureau et al. teach that in packaging surface acoustic components on a substrate, after sheathing the components with a deformable film, a conductive layer is deposited on the surface of the film (col. 4, lines 34-35).

It would have been obvious to one of ordinary skill in the art to have modified the method of the references as combined by depositing a conductive layer (electroconductive layer) on the hardened resin on the aggregate circuit board substrate, as taught by Bureau et al. as deposited on the film on surface acoustic components mounted on a substrate. By depositing the conductive layer, an electroconductive layer is formed on the surface of the surface acoustic wave devices opposite the surface mounted to the circuit boards after mounting, as encompassed in Claim 22.

***Allowable Subject Matter***

(9)

Claims 8, 20 and 39 are allowed.

*Conclusion*


(10)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Melvin Curtis Mayes whose telephone number is 571-272-1234.

The examiner can normally be reached on Mon-Fri 7:30 AM - 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chris Fiorilla can be reached on 571-272-1187. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Melvin Curtis Mayes  
Primary Examiner  
Art Unit 1734

MCM  
October 26, 2006